

Fostering Public Awareness

What's the issue?

Most Wisconsin residents interact with and use groundwater on a daily basis. Around 70% of residential drinking water, one third of industrial and commercial water and nearly all agricultural irrigation water comes from groundwater (Maupin et al., 2014). Yet if you were asked, "What does groundwater look like?" would you feel confident in your answer?

If you answer "no," you are not alone. Wisconsin's "buried treasure" is largely out of sight beneath the ground, so it can be very difficult for people to visualize the resource and understand our relationship with it. Often, people apply what they know about surface water to the groundwater beneath our feet and picture underground lakes, rivers, and "veins of water." But actually, groundwater is stored in the pores between soil particles and cracks in rocks and is below us everywhere we walk.

Similarly, it is common to believe that groundwater is very old, very pure, and filtered from what humans do on the land surface. In fact, the water in many wells is only a few years to a few decades old and the quality of that water can be vulnerable to what occurs on the land surface during that time. The quality of groundwater drawn from deep aquifers can also be highly variable depending on the natural geochemistry of the rock that water is drawn from.

Members of the Groundwater Coordinating Council have been national leaders in developing creative ways to present consistent educational messages about how groundwater flows and how our actions can affect the quantity and quality of that water. From sand tank visualization models to investigations into the barriers to private well testing, Wisconsin residents have benefited from the GCC's dedicated efforts to foster public awareness of how to protect the water that sustains our environment, powers our economy, and keeps us healthy.

GCC in Action: *Teacher Training Workshops*

How do GCC agencies help people understand how groundwater works? Make it visible! The groundwater sand tank model, first produced in the early 1980s in a basement by two UW-Madison professors, does exactly that. The model represents a slice or cross-section view of the earth so students can "see" groundwater and interactively explore how water and contaminants flow through different geologic materials. Concepts such as water table levels, groundwater recharge, and the effects of pumping on groundwater flow come alive when students see the model. Today, this model is so popular that it has been patented and is sold widely across the United States through Ward Scientific Catalogue, with a portion of the proceeds returning to groundwater education in Wisconsin.

To get these [sand tank groundwater models \[video link\]](#) into the hands of educators, the Wisconsin DNR, the Wisconsin Geological and Natural History Survey and the UW-Stevens Point Center for Watershed Science and Education collaborate to host teacher training workshops every year. Using funding from an EPA grant, educators from schools or nature centers around the state apply and are selected to receive a one-day training session, a groundwater flow model and instructions on using it,

classroom exercises designed to meet state academic standards, and reimbursement for substitute teachers while at the training.

Since 2001, educators from over 500 schools or nature centers have received training and a free model through this program. Response from these workshops is always overwhelmingly positive, with 90% agreeing that the sand tank model is a necessary instructional tool for teaching about groundwater. By the time they leave, educators are better prepared to pass on to students, parents, and their community knowledge of how groundwater moves, how groundwater contamination happens, and ways to protect the resource.

Successful groundwater management depends on dispelling myths and fostering public understanding of the resource. Through the cooperation of these GCC agency partners, a new generation of students, parents, and teachers are more aware of the complex relationship we have with groundwater, our valuable buried treasure.



Students eagerly waiting to see how "contamination" flows from a seepage pond. Photo: Doug Gouff

Other Projects in Other Places

An ongoing focus of the GCC is promoting consistent messages about groundwater in publications from member agencies. The magazine, "Groundwater: Wisconsin's Buried Treasure" is published by the Wisconsin DNR with enormous input from other GCC agencies and is the most successful of these publications. Thousands of copies are requested each year and distributed free of charge to Wisconsin students, homeowners, and community groups. As with the sand tank model and teacher training workshops, the focus of "Buried Treasure" is on demystifying what groundwater is, how it works, and what the relationship is between groundwater and the people, economy, and environment of Wisconsin.

One of the most compelling reasons to foster public awareness about groundwater is that about half of the Wisconsin residents who get their drinking water from groundwater rely on private wells. While public water systems are regulated by state and federal safe drinking water legislation, the protection and maintenance of a private well – including regular testing of water quality – is largely up to the owner. To protect the health of their families, it is important that these owners know that they should test, what to test for, and how to obtain and interpret results. Surveys by researchers funded through the Wisconsin Groundwater Research and Monitoring Program (WGRMP) find that statewide, no more than 10%-16% of private well owners have tested their well water for *any* contaminant within the past year (Knobloch et al., 2013; Schultz et al., 2015).

In order to improve the effectiveness of GCC agency outreach efforts, a recent WGRMP-funded research project explored the barriers to testing private wells (Schultz et al., 2015). Survey results reveal that a critically important predictor of well testing is whether owners feel that they have sufficient knowledge about what to test for. When asked to identify more specific reasons why they did not test, the most common barriers included:

- Perceptions that well water is safe to drink
- Lack of previous problems identified in a community
- Feelings of security after drinking water for years

This indicates that knowledge sharing about groundwater at a local level is key to encouraging the testing behaviors that protect human health. Findings like these underscore the importance of fostering public awareness of groundwater and help GCC agency members continue to adjust their outreach messages to target the most prevalent sources of confusion. Tools such as the [Wisconsin Well Water Quality Viewer](#), the [Environmental Public Health Tracking](#) county profiles, and targeted testing programs by local public health departments are some of the ways GCC partners are working to bring knowledge about local groundwater quality risks to residents.

References

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Schultz, A. and K.C. Malecki. 2015. Reducing human health risks from groundwater: private well testing behaviors and barriers among Wisconsin adults. Wisconsin groundwater management practice monitoring project, DNR-221.